REMARKS

1. General

The Examiner has objected to a number of the claims (31, 34, 37, 40 and 42) on the basis of insufficient antecedent in the claim. The Examiner has rejected Claims 30 - 43 under §112, first paragraph, as containing subject matter not described in the specification. The Examiner has rejected Claims 30 - 43 under §112, second paragraph, as being indefinite with regard to certain terminology in the claims. Examiner has rejected Claims 30 - 43 under §102(b) as being anticipated by **Leggett III et al.**

2. Response To Claim Objections

The Examiner has objected to Claims 31, 34, 37 and 42 as reciting insufficient antecedent basis for "received acoustic signals" and "received acoustic noise signals." The claims have been amended to provide this antecedent basis. The Examiner has objected to Claim 40 for having insufficient antecedent basis for the limitation "acoustic sensor." Applicant has amended the claim to read "acoustic receiver."

3. Response on Rejection Under §112, First Paragraph

The Examiner has rejected Claims 30 through 43 under §112, first paragraph, as containing matter not described in the specification. Specifically, the Examiner has rejected Claims 30-43 because the claim limitation "first and second threaded ends" is not described in the specification. Applicant notes the thoroughly understood structure in the field of art associated with drill strings and the individual tool components that make up such drill strings. Nonetheless, the Applicant has amended the claims to eliminate reference to "threaded" ends and to "threadedly" connecting The Examiner has rejected Claim 40 under §112, first paragraph, due to the limitation "acoustic sensor" in the claim. Applicant has amended Claim 40 to read "acoustic receiver" as was the original intent in the claim.

4. Response and Rejection Under §112, Second Paragraph

The Examiner has rejected Claims 30-40 under §112, second paragraph, as being indefinite. The Examiner points to the term "substantially" in the claims as a relative term. Applicant has amended the claims to cancel the term substantially and replace it with terms that make the claim more definite.

5. Response and Rejection Under §102(b) (Leggett III et al.)

The Examiner has rejected Claims 30 - 43 under §102(b) as being anticipated by **Leggett III et al.** Applicant believes that the basis for the Examiner's rejection centers on a mischaracterization of elements identified in **Leggett** (Fig. 2, reference No. 152) as "other sensors" and the drawing of a equivalent between such other sensors in **Leggett** and the "one or more sensors responsive only to noise signals" claimed in the present invention. In fact, the "other sensors" 152 identified in **Leggett** have nothing to do with noise measurements whereas the "one or more sensors" in the claims of the present invention are specifically referred to in the claims as being "responsive only to noise signals."

It is clear from a reading of the present application as a whole that it is directed to a method for canceling noise elements from an acoustic signal transmitted into the formation and received back by the acoustic receivers in the system. **Leggett** has no teaching of sensors responsive only to noise signals.

The subject application has the following elements in common with **Leggett**: they both involve an acoustic logging device, they each include a transmitter for transmitting acoustic signals into the formation, and they each include a receiver for receiving acoustic signals returning from said formations. **Leggett** has no teaching of sensors responsive only to noise signals. The sensors in Fig. 2:152 of **Leggett** are described beginning on Column 8, line 41:

FIG. 2 shows a functional block diagram of the major elements of the downhole subassembly 59 and further illustrates the data communication paths between the various system elements. It should be noted that FIG. 2 illustrates only one arrangement of the elements and a system of data communication there between. Other arrangements may be utilized equally effectively for the purpose of this invention. **For convenience, the sensors for determining the downhole operating conditions and the downhole assembly health are denoted by S_1-S_j,** (*emphasis added*) the acoustic sensor system is denoted by numeral 160 **while the remaining downhole MWD devices, such as the nuclear, electromagnetic, directional and the like, are denoted by d_1-d_m. The sensors S_1-S_j, MWD devices d_1-d_m** (*emphasis added*) and the desired acoustic sensor system 160 are arranged within the downhole subassembly in a desired manner. During operation, a predetermined number of discrete data points output from the sensors and MWD devices are stored within a buffer which, in FIG. 2, is included as a partitioned portion of the memory capacity of the computer 150. Alternatively, the buffer storage can comprise a separate element (not shown).

Sensor response relationships or "models" for the acoustic sensor system and other sensors in the downhole subassembly are preferably stored in a memory 148. These models are determined mathematically and/or by measuring responses of the sensors in a known test formations. In addition, other reference data such as data defining the targeted formations to be drilled, seismic data, offset well data is preferably stored downhole in the memory 148. A two-way data and command signal communications are provided between the computer 150 and the second memory 148. **The responses from the sensors S_1-S_j, d_1-d_m and 160 are transmitted to the computer 150 wherein they are transformed into parameters of interest or answers as described later** (*emphasis added*). The downhole electronics for processing signals downhole and to perform other computations includes the computer or controller 150, first and second memory 148 and 146, and other desired components, such as signals processors, amplifiers, etc. (not shown). For simplicity, the use of such components is known and are thus, not included in FIG. 2.

Still referring to FIG. 2, **the parameters of interest are transmitted to the surface via the up-link telemetry path 127 or stored in the memory 146 for subsequent retrieval at the surface** (*emphasis added*). Since the acoustic sensor system 160 **and other sensors 152 and d_1-d_m** (*emphasis added*) are placed axially along the downhole subassembly, their responses do not correspond to the same measure point within the borehole 26 (see FIG. 1). Prior to combining or correlating the data from different sensors, the computer 150 shifts the data to a common depth point. **Also, the various devices d_1-d_m do not necessarily exhibit the same vertical resolution** (*emphasis added*). Therefore, vertical resolution matching is performed by the computer 150 before combining or correlating measurements from different sensors.

> Once computed from the depth-shifted and resolution-matched data, **the parameters of interest are then passed to the downhole transmitter element 142b of the telemetry system 142 and subsequently telemetered to the surface** (*emphasis added*) by a suitable up-link telemetry link illustrated conceptually by the broken line 127. The power source 144 supplies power to the telemetry element 142, computer 150, memories 146 and 148 and associated control circuits (not shown). Information from the surface is transmitted over the downlink telemetry path illustrated conceptually by the broken arrow 129 to the downhole receiving element 142a of the downhole telemetry unit 142, and then transmitted to the data storage unit 148 for subsequent use.

In short, the sensors that the Examiner has identified have nothing to do with noise measurements and the processor referred to is not used for noise cancellation. The sensors the Examiner has identified are of two types: S_1 - S_j measure environment parameters, either used to apply corrections to the MWD sensors d_1 - d_m, or they provide environmental parameters of interest to the user. They are not combined with the acoustic measurements downhole.

Conclusion

Applicant has responded to each objection and rejection raised by the Examiner and has amended the claims where applicable to clarify the scope of the limitations and their distinctions over the cited reference. Applicant has generally distinguished **Leggett III et al.** as describing a tool that utilizes acoustic receivers but provides no second set of sensors designed to receive only acoustic (mechanical wave) signals in the form of noise and to cancel (subtract) such noise from the transmitted and received acoustic signal that interrogates the surrounding formation. Applicant now respectfully requests reconsideration of the rejection of the claims and their passage to allowance. Should any further impediments to allowance remain, Applicant requests that the Examiner contact the undersigned attorney at the indicated phone number.

Respectfully submitted,

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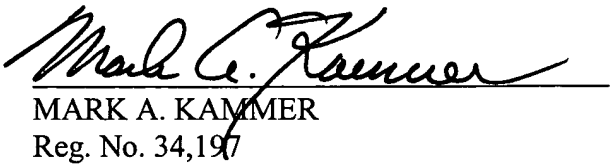
By: 

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